



## Department of Toxic Substances Control



Terry Tamminen  
Agency Secretary  
Cal/EPA

Edwin F. Lowry, Director  
1001 "I" Street, 25<sup>th</sup> Floor  
P.O. Box 806  
Sacramento, California 95812-0806



Arnold Schwarzenegger  
Governor

January 28, 2004

Mr. Michael Fariba  
U.S. Circuit, Inc.  
1526 Sterling Court  
Escondido, California 92029

Dear Mr. Fariba:

Thank you for the letter requesting that the Department of Toxic Substances Control (DTSC) evaluate the hazardous waste characteristics of your rinse water containing cyanide. We had hoped to address some of your issues in the development of regulations pertaining to cyanide containing rinsewater. These regulations have yet to be developed, and we apologize for the delay in our response. DTSC is unable to evaluate the toxicity of the U.S. Circuit cyanide containing rinse water at this time because the test results submitted by U.S. Circuit are insufficient to properly characterize the waste.

Pursuant to Chapter 11 of title 22, division 4.5 of the California Code of Regulations, any cyanide-bearing waste may be hazardous due to its toxicity or reactivity (or both). In addition, in California, all wastes containing cyanide salts are presumed to be extremely hazardous, unless the generator determines that the waste is not extremely hazardous. The hazardous waste determination is made through testing representative samples of the waste and/or by applying knowledge of the hazard characteristics of the waste. Since constituents in a waste other than cyanide may effect the relative toxicity of the waste, the overall toxicity of the waste must be evaluated. The determination should be documented and the results retained in the generator's files.

While testing may include a determination of the total concentration of cyanide in the waste as submitted with your letter, U.S. Circuit should gather additional analytical data regarding the toxicity of the rinse water including data regarding any other potentially hazardous components of the waste stream. Samples should be taken periodically to determine if the concentrations of constituents or characteristics of the waste stream changes over time. Once US Circuit has collected sufficient test data, it should determine if the rinse water is hazardous by any of the criteria in Chapter 11. If U.S. Circuit determines it rinse water is non-hazardous waste, it may submit all additional analytical data to DTSC for a non-hazardous concurrence pursuant to 22 CCR 66260.200.

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Current State law prohibits the destruction of cyanide in hazardous wastes (treatment) without authorization from DTSC. DTSC is however, developing and adopting regulations to authorize such treatment under one of the onsite treatment tiers. Until those regulations are adopted, you may contact Asha Arora at (510) 540-3874 regarding options for on site treatment of cyanide-bearing wastes.

If you have any further questions, please feel free to contact Mr. Charles Corcoran of my staff at (916) 327-4499.

All correspondence regarding this letter should be submitted to DTSC at the following address:

Department of Toxic Substances Control  
Statewide Compliance Division  
700 Heinz Avenue  
Berkeley, California 94710-2721  
Attention: Asha Arora

Sincerely,



Karl Palmer, Chief  
Regulatory Program Development Branch  
Hazardous Waste Management Program

Enclosures

cc: Ms. Asha Arora  
Statewide Compliance Division  
Department of Toxic Substances Control  
700 Heinz Avenue  
Berkeley, California 94710-2721

Mr. Kim F. Wilhelm, Chief  
Statewide Compliance Division  
Hazardous Waste Management Program  
Department of Toxic Substances Control  
8800 Cal Center Drive, 2<sup>nd</sup> Floor  
Sacramento, California 95826-3200

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cc: Mr. Charles A. McLaughlin, Chief  
Statewide Compliance Division  
Department of Toxic Substances Control  
8800 Cal Center Drive  
Sacramento, California 95826-3200

Mr. Charles Corcoran, Chief  
Waste Identification and Recycling Section  
Hazardous Waste Management Program  
Department of Toxic Substances Control  
1001 "I" Street, 11<sup>th</sup> Floor  
P.O. Box 806  
Sacramento, California 95812-0806

## MEMORANDUM

TO: Diana Love, Director, NEIC

FROM: David Bussard, Director, HWID  
Barnes Johnson, Director, EMRAD

SUBJECT: Withdrawal of Cyanide and Sulfide Reactivity Guidance

Thank you for your memorandum of February 18, 1998 regarding your concerns about the effectiveness of the Office of Solid Waste's guidance for evaluating potentially reactive cyanide- and sulfide-bearing wastes. These wastes are regulated as characteristically hazardous (waste code D003) at 40 CFR 261.23(a)(5) under a narrative description of reactivity. In July 1985, OSW issued guidance describing a likely mismanagement scenario for cyanide- and sulfide-bearing wastes and providing guidance on "safe" threshold levels for cyanide and sulfide in these wastes in that scenario. The guidance also provided a laboratory method for evaluating these wastes. This guidance was later incorporated into Chapter 7 of SW-846, the Agency's overall guidance document for testing wastes. Your memo expressed serious concerns about the effectiveness of this guidance in evaluating the hazards posed by cyanide- and sulfide-bearing wastes over the full range of likely management scenarios. It also urged OSW to withdraw the guidance.

OSW staff have carefully reviewed and discussed in detail the concerns you raised in your memo and its attachments, and have also reviewed the original guidance mismanagement scenario, derivation of the guidance threshold values, and relation of the scenario and thresholds to the results of the test. After this careful consideration, it is our conclusion that there were critical errors made in developing the guidance, that your concerns regarding the reliability of the guidance are well founded, and that the guidance should be withdrawn. This memo withdraws the July, 1985 guidance. A Federal Register notice announcing the withdrawal of the guidance from SW-846 will be prepared as soon as is feasible.

Your memo raised several concerns about the guidance. These concerns and our replies are:

1. NEIC Concern: The current test does not evaluate waste over the full range of pH values specified in the regulation (pH 2 to 12.5). While the test begins with acid at pH 2, immediately after mixing with the waste, the pH of the mixture may change. It may be somewhere within the range of 2 to 12.5 if the waste does not bear much acidity or alkalinity (due to neutralization or stabilization), but it may not be within this range if the waste does bear substantial acidity or alkalinity. Nevertheless, the test evaluates a single pH condition and not the range of pH conditions (2 to 12.5) specified in the regulations.

Reply: You are correct, the test will not always be run at the low end of the pH range specified in the regulation (and does not test at the high end of the range). However, the implications and importance of this are not clear, as solubility of the cyanide salts present also affects the rate of conversion to HCN. The addition of a fixed amount of acid with a pH of 2.0 to a waste that may have a substantially higher pH means that when these are mixed, the resulting pH will be higher than pH 2.0. The pH range specified in the regulation was chosen because outside of the pH range 2 to 12.5, the waste acid or base to which the evaluated material is added would be considered a corrosive hazardous waste, and consideration of waste compatibility would be required by 40 CFR 264.17 before the wastes are mixed. This would prevent many dangerous situations from occurring. However, an overwhelming volume of waste acid at pH 2 could be legally added to other wastes, with potentially dangerous effects if the other wastes bear releasable cyanides. In addition, some cyanide salts are much more soluble (and, therefore, more available to react) under high pH conditions; evaluation of hazard under these conditions, as well as at low pHs, should be explored.

2. NEIC Concern: The test and threshold limits presented in the 1985 memo fail to account for Henry's Law, which describes the air-aqueous partitioning of the toxic gases. The result is that the amount of nitrogen used in the test to recover the evolving hydrogen cyanide gas recovers only a small amount of the hydrogen cyanide gas generated. A similar problem, although not as severe, exists for the evolution of hydrogen sulfide gas. Both theoretical calculations and practical tests in our laboratory and other laboratories, demonstrate recoveries in the range of 2% to 3% of the cyanide present. Somewhat higher recoveries are obtained for sulfide, but still not a quantitative recovery.

Reply: In developing the guidance test, the Agency was not seeking a method that would achieve complete recoveries of hydrogen cyanide and hydrogen sulfide, but rather was attempting to evaluate the risks from wastes in a particular mismanagement scenario. Because hydrogen cyanide is extremely soluble in

water, high recovery rates will not be achievable. Henry's Law may be important for assessing hydrogen sulfide, but does not appear to be critical to our judgements about highly soluble gases or to gases that interact with water. This may explain the differences in recovery between hydrogen cyanide and hydrogen sulfide as measured in NEIC tests. We will work with your staff to better understand the role of Henry's Law in the evolution of dissolved HCN gas as we develop revised guidance.

3. NEIC Concern: The test method and the mismanagement scenario are different with respect to air volume, aqueous solution volume, and the amount of waste. According to Henry's Law, this means that toxic gas partitioning between the air and aqueous volumes will be different. The threshold limits fail to account for these differences, and thus are not founded in good science.

Reply: We have reviewed the original mismanagement scenario and laboratory test conditions, and agree that the conditions (air volume, aqueous solution volume, and waste mass) are different and not correctly scaled between the mismanagement scenario and test (see Attachment 1). There were also several errors made in setting up the calculations in the mismanagement scenario (see Attachments 2 and 3). The fact that these important parameters are mismatched in the laboratory test and the open pit mismanagement scenario means that the test (under these conditions), and the threshold values, do not evaluate the mismanagement scenario conditions. Also, the "dumpster" and "tank" mismanagement scenarios, and your theoretical calculations, described in Attachment II, indicate that the open pit scenario used in the 1985 guidance may not be a true plausible worst case mismanagement/exposure scenario. The Agency clearly needs to consider these alternative mismanagement scenarios as revised guidance is developed.

Until revised guidance is developed, we reiterate the RCRA regulatory language. That is, 40 CFR 261.23(a)(5) specifies that human health and the environment must not be endangered by evolved toxic gases when these wastes are exposed to pH conditions between 2 and 12.5. Any waste causing a hazard, when in the pH range of 2-12.5, would certainly be considered a characteristic hazardous waste.

We understand that withdrawal of the guidance today means that waste generators who have relied on this guidance in the past will, in the near term, have somewhat greater uncertainty about determining the regulatory status of their cyanide- and sulfide-bearing wastes. However, the Agency believes that generators of sulfide- and cyanide-bearing wastes can recognize the acute toxicity of sulfides and cyanides without relying on the test in the guidance. Where wastes with high concentrations of soluble sulfides and cyanides are being managed, generators have relied on their knowledge of the waste to classify them as D003. The Agency expects that generators should continue to classify their high

concentration sulfide- and cyanide-bearing wastes as hazardous based on the narrative standard.

Regarding LDR treatment requirements, there are numerical treatment standards for cyanide waste in 40 CFR 268.40 (compliance with these standards is based on different tests than the tests under consideration in this memo; nothing in this memo changes those standards in any way). However, the reactive sulfide treatment standards require that the waste be "deactivated", without specifying numerical treatment standards. Withdrawal of the guidance may leave some generators uncertain about the type and degree of treatment needed to meet the standard for sulfide-bearing wastes. The treatment methods described in 40 CFR 268 Appendix VI, when operated appropriately, can effectively treat sulfide reactive wastes.

Going forward, OSW staff will contact your staff to begin the effort to delete the cyanide and sulfide guidance values and test methodology from Chapter 7 of SW-846. We will also coordinate with your staff to create a working group to explore the development of more specific alternative guidance that relies on: (1) our improved modeling tools for evaluating hazards posed by cyanide- and sulfide-bearing wastes; and (2) better chemical analysis tools for measuring HCN and H<sub>2</sub>S release.

Attachments (3)

ATTACHMENT 1: COMPARISON OF CYANIDE/SULFIDE TEST CONDITIONS AND MISMANAGEMENT SCENARIO CONDITIONS

Issue	Treatment in test	Treatment in mismanagement scenario
Air Volume	60 ml/min X 30 min= 1.8L = 0.0018m <sup>3</sup> (Test uses nitrogen flow through enclosed flask)	15m X 1.5m X 4 m= 90m <sup>3</sup> (A fixed block of unmixed air moves across the pit)
Liquid volume	250 ml less waste vol	Not specified in scenario. Approx 15m X 15m X 2.5m=600m <sup>3</sup>
Time	30 min X 60 sec/min= 1800 sec	Assumes 10 seconds for a fixed air volume to move across the pit and become contaminated
Mass of waste available to react	10 g waste sample	10% per second of 6130 kg (for 10 seconds)
Total HCN released to cause 10 mg/m <sup>3</sup> HCN	10 mg/m <sup>3</sup> X 0.0018 m <sup>3</sup> =0.018 mg HCN	10 mg/m <sup>3</sup> X 90 m <sup>3</sup> =900 mg
Ratio air vol/mass waste	0.0018 m <sup>3</sup> /0.010 kg=0.18 m <sup>3</sup> /kg waste	90 m <sup>3</sup> /6130 kg=0.015 m <sup>3</sup> /kg waste
Evolution rate of HCN per kg waste present	(0.018mg/1800 sec)/ 0.01 kg waste = 0.001 mg-sec <sup>-1</sup> /kg waste	(900 mg/10 sec)/6130 kg= 0.015 mg-sec <sup>-1</sup> /kg waste
Theoretical HCN evolution rate	0.018 mg/1800 sec=1 X 10 <sup>-5</sup> mg/sec	900 mg/10 sec= 90 mg/sec
Total HCN needed to be evolved per kg waste present to cause 10 mg/m <sup>3</sup> HCN	0.018 mg HCN/0.010 kg sample= 1.8 mg HCN/kg waste	900 mg HCN/6130 kg = 0.15 mg HCN/kg waste

## ATTACHMENT 2: ANALYSIS OF CALCULATIONS IN JULY 1985 RELEASABLE SULFIDE/CYANIDE GUIDANCE

Calculation presented in mismanagement scenario:

$$R = \text{Guidance threshold level} = \frac{\text{Amount of toxic gas that has to be released/length of test}}{\text{Mass of waste available to release H}_2\text{S (or HCN)}} \quad (1)$$

Adding values to the calculation:

$$R = \frac{(V) (C) (1800/10)}{(M/10)} \quad (2)$$

Where: V= the contaminated air volume= 90 m<sup>3</sup>  
C= air threshold level=10 mg/m<sup>3</sup>  
1800= Seconds in laboratory test  
10 (numerator)= Seconds in mismanagement scenario-- i.e., it takes 10 seconds for the slice of air to move across the pit  
M=mass of waste =6130 kg  
10=(denominator) percentage of pit area available to contaminate air, per second= 10%-sec<sup>-1</sup>  
Note: Not all values were labeled with units in the guidance memo; assumed units based on information provided in the guidance are: the 1800 seconds, 10 seconds (numerator) and 10%-sec<sup>-1</sup>(denominator).

$$R = \frac{(90\text{m}^3) (10 \text{ mg/m}^3) (1800\text{sec}/10\text{sec})}{(6130\text{kg}/10\text{\%-sec}^{-1})} \quad (3)$$

$$R = 264 \text{ mg-sec HCN/kg waste} \quad (4)$$

In performing the above calculation, the units fail to cancel to the units of the threshold value of 250 mg/kg waste. There is an extra "seconds" left over which makes the units of the calculation mg-sec/kg waste, a nonsense result.

Also, in moving from the initial form of the calculation (1) to addition of values (2), the equation appears to change. In (1) the total mass of HCN needed to contaminate the air is divided by the length of the test. In (2), the total amount of HCN needed to contaminate the air volume is multiplied by the ratio of the time in the laboratory test to the time it takes the slice of air to move across the pit and become contaminated.

However, the more fundamental error is in introducing time into the equation at all; there are two time errors. The first is in introducing the test time frame (1800 sec) into the mismanagement scenario calculation. This results in an 1800-fold error in the resulting threshold value, and a trailing "seconds" unit. The second time error is in requiring 10% per second of the waste be available to contaminate the 90m<sup>3</sup> of air as it moves across the pit in 10 seconds. The values and units here cancel out, but there is still the trailing "seconds" from the 1800 seconds on test that results in nonsense units on the answer.

Because the air volume to be contaminated is fixed and unmixed, the only important calculation is the total amount of HCN evolution required to contaminate the 90m<sup>3</sup> slice of air above the pit. If we want a standard in relation to the amount of waste present, then:

$$R = \frac{(90\text{m}^3) (10 \text{ mg/m}^3)}{6130 \text{ kg waste}}$$

$$R = 0.147 \text{ mg HCN/kg waste}$$

If this result is multiplied by the erroneously included 1800 seconds, the result is 264 mg-sec HCN/kg waste, the incorrect guidance value in the 1985 memo.

The attached table (Attachment 1) shows that this calculated result is unrelated to the laboratory test it was associated with. If we want to relate this result to laboratory test results, additional calculations that correctly scale the static conditions of the mismanagement scenario to static test conditions would be needed. Time (or gas evolution rate) could be added to this guidance value and the laboratory test with additional development work. Developers of the guidance and test apparently believed the rate of gas evolution was important (since they included it in the calculations), they simply included it incorrectly.

However, another significant concern about presenting the guidance in this form (i.e., mg HCN/kg waste) is that the guidance value is

totally dependent on the waste volume (and air volume) used. A tenfold change in the waste volume or static air volume results in a tenfold change in the guidance threshold, a clearly unsatisfactory result. Revised guidance will need to incorporate the need to consider mismanagement scenarios different from the one presented in the guidance.

**FACILITY INFORMATION FORM**  
**ONSITE TREATMENT OF CYANIDE WASTES**

*For Use by Hazardous Waste Facility Performing Onsite Treatment of Aqueous Wastes  
Containing Cyanide at Levels That are not Extremely Hazardous or Reactive*

**I. FACILITY INFORMATION:**

EPA ID Number \_\_\_\_\_

Facility Name \_\_\_\_\_

Physical Location \_\_\_\_\_

City \_\_\_\_\_ CA Zip \_\_\_\_\_

County \_\_\_\_\_

Contact Person \_\_\_\_\_

Title \_\_\_\_\_

Phone Number (\_\_\_\_) \_\_\_\_\_

Mailing Address (If different)  
\_\_\_\_\_  
\_\_\_\_\_

Type of Company: Standard Industrial Classification Code \_\_\_\_\_

EPA ID Number \_\_\_\_\_

**II. TREATMENT INFORMATION: Wastestream(s) and Treatment Process(es) of Aqueous Waste Containing Cyanide.**

Unit Name \_\_\_\_\_ Unit ID Number \_\_\_\_\_

Number of Treatment Devices \_\_\_\_\_ Tank(s) \_\_\_\_\_ Container(s) \_\_\_\_\_

1. Estimated Monthly Total Volume, Treated:  
\_\_\_\_\_ (gallons) and or \_\_\_\_\_ (pounds)  
\_\_\_\_\_ (mg/liter) cyanide concentration before treatment
2. Narrative description of the cyanide onsite treatment activity: *(Provide a brief description of the following).*
  - a. Waste Type Treated: *(Include cyanide waste point of generation).*  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  - b. Treatment Process(es) Used for Cyanide Destruction:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  - c. Residual Management: *(Include a description of the method of disposal of the waste after treatment).*  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**III. Other wastes treated onsite:** *(If any, provide a brief description of other hazardous wastes treated onsite such as waste type, treatment process, and residual management. Discuss method of disposal of the wastes after treatment).*

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**IV. ATTACHMENT:**

**Plot Plan** *(Submit a plot plan/map detailing the location(s) of the covered unit(s) in relation to facility boundaries).*

EPA ID Number \_\_\_\_\_

**V. BASIS FOR NOT NEEDING A FEDERAL PERMIT:**

*To demonstrate eligibility for under the California state law treatment tiers, facilities are required to provide the basis for determining that a hazardous waste permit is not required under the federal Resource Conservation and Recovery Act (RCRA) and the federal regulations adopted under RCRA (Title 40, Code of Federal Regulations (CFR)).*

Choose the reason(s) that describe the operation of cyanide onsite treatment units:

- \_\_\_ 1. The waste is treated in wastewater treatment units (tanks), as defined in 40 CFR part 260.10, and discharged to a publicly owned treatment works (POTW)/sewerage agency or under an NPDES permit. 40 CFR 264.1(g)(6) and 40 CFR 270.2.
- \_\_\_ 2. The waste is treated in a totally enclosed treatment facility as defined in 40 CFR Part 260.10 and 40 CFR 264.1(g)(5).
- \_\_\_ 3. The company generates no more than 100 kg (approximately 27 gallons) of hazardous waste in a calendar month and is eligible as a federal conditionally exempt small quantity generator. 40 CFR 260.10 and 40 CFR 261.5.
- \_\_\_ 4. The waste is treated in an accumulation tank or a container within 90 days for over 1000 kg/month generators and 180 or 270 days for 100 to 1000 kg/month generators. 40 CFR 262.34, 40 CFR 270.1(c)(2)(I), and the Preamble to the March 24, 1986 Federal Register.
- \_\_\_ 5. Other:  
Specify \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**VI. CERTIFICATIONS:** *This form must be signed by an authorized corporate officer or any other person in the company who has operational control and performs decision making functions that govern operation of the facility (per California Code of Regulations (CCR), Title 22 section 66270.11).*

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those directly responsible for gathering the information, the information is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

\_\_\_\_\_  
Owner/Operator Signature

\_\_\_\_\_  
Date Signed

\_\_\_\_\_  
(Type or print) Name, and Title

EPA ID Number \_\_\_\_\_



Terry Tamminen  
Agency Secretary  
Cal/EPA



## Department of Toxic Substances Control

Edwin F. Lowry, Director  
8800 Cal Center Drive  
Sacramento, California 95826-3200



Arnold Schwarzenegger  
Governor

January 28, 2004

Mr. Jack Mason  
Opti-Blast, Inc.  
P.O. Box 2079  
Jacksonville, Texas 75766

### RECYCLING SPENT PLASTIC BALSTING MEDIA (SPBM)

Dear Mr. Mason,

Thank you for your unsigned letter to the Department of Toxic Substances Control (DTSC) requesting that the State of California acknowledge or accept the State of Texas Commission on Environmental Quality's (TCEQ) technical analysis<sup>1</sup> of Opti-Blast's SPBM recycling program. Along with your letter you submitted copies of that TCEQ analysis and a TCEQ information sheet on universal wastes.

Unlike Texas, California does not regulate paint-related wastes, such as SPBM, as universal wastes. In California, spent blast media that exhibit a characteristic of a hazardous waste are regulated as hazardous wastes. Hence, a permit or other grant of authorization from DTSC would be required for the offsite storage of hazardous waste SPBM in California (even if the storage were for less than one year as allowed under Texas' universal waste rule).

Although California Health and Safety Code, section 25143.2 excludes from the State's definition of "waste" material which is used or reused as a safe and effective substitute for a commercial product (provided the material is not reclaimed), the SPBM recycled by Opti-Blast does not appear to qualify for this exclusion because it contains toxic constituents which are not present in the virgin commercial product(s) and these hazardous waste constituents do not add any value to, or serve any beneficial purpose in, the final end-product. (I.e., the SPBM contains toxics along for the ride or TARs).

SPBM generated in California and recycled into stair/step coatings and pipe bollard filling materials, as described in your letter, would be regulated as hazardous waste in California. If the waste SPBM were transported out-of-state for recycling, the transportation would have to be performed by a registered hazardous waste transporter and a hazardous waste manifest would have to be completed for each shipment [Health and Saf. Code, section 25163]. If the waste SPBM were recycled in California, pursuant

Mr. Jack Mason

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to California Health and Safety Code, section 25201, a hazardous waste facility permit would be required for the storage and treatment (recycling) of the waste SPBM.

If you have questions regarding this letter, please call Mr. Charles Corcoran of my staff at (916) 327-4499.

Sincerely,

A large black rectangular redaction box covering the signature and name of the sender.

Mr. Karl Palmer, Chief  
State Regulatory Program Development Branch

cc: Mr. Kim Wilhelm, Chief  
Statewide Compliance Division  
Toxic Substances Control  
8800 Cal Center Drive  
Sacramento, California 95826

Mr. Charles Corcoran, Chief  
Waste Identification and Recycling Section  
Department of Toxic Substances Control  
P.O. Box 806  
1001 "I" Street, 11<sup>th</sup> Floor  
Sacramento, California 95812-0806